

# PATENT ABSTRACTS OF JAPAN

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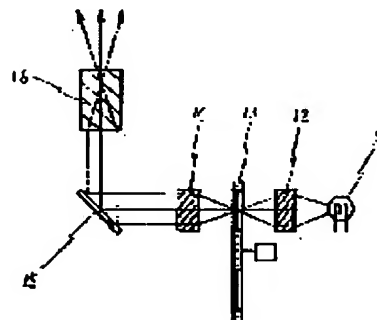
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## (54) STEREOSCOPIC IMAGE DISPLAY DEVICE

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a stereoscopic image display device, which eliminates the need for a connection cord, etc., for spectacles and need not have its image position adjusted.

**SOLUTION:** The light of a white light source 11 is converged on a rotary polarizing color filter 13 through a converging lens 12, the light which is modulated in the order of red, green, and blue in series through the filter is guided to a DMD(digital micrometer display) 15 by a condenser lens 14, and the reflected light which is optically modulated into images matching the respective colors through the DMD is projected by a projection lens 16 to form an image on a screen, and the color filter 13 is composed of six filters, i.e., a red filter, a green filter, and a blue filter which are polarized in an emission direction, and a red filter, a green filter, and a blue filter which are polarized in a circumferential direction.



## LEGAL STATUS

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] Condense the light of the source of the white light on a revolution light filter with a condenser lens, and the light which carried out the color modulation is serially led to the order of red, green, and blue with a condensing lens through this at DMD (digital micro mirror display). The reflected light which carried out light modulation to the image set by each color by DMD with a projection lens The solid image display device characterized by having arranged even pairs in the display which projects an image on a screen, having used as one pair three filters which are the three primary colors of a color about the above-mentioned revolution light filter, and carrying out the \*\*\*\* configuration of the polarization direction for every pair.

[Claim 2] The solid image display device characterized by the thing of a convention of a polarizing filter to do for an include-angle revolution to the timing which equips the optical path of an image display device with the polarizing filter held pivotable, and changes the image the object for left eyes, and for right eyes to it.

[Claim 3] The solid image display device characterized by compounding and projecting the image which formed the image for right eyes by the 1st DMD, formed the image for right eyes by the image which polarized through the 1st polarizing plate, and the 2nd DMD, and polarized through the 1st polarizing plate and the 2nd polarizing plate with which whenever [ polarization angle ] differ.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]** This invention relates to the solid image display device which uses an image, an alphabetic character, etc. for the projector displayed in three dimensions, a display, etc.

**[0002]**

**[Description of the Prior Art]** It equips with the glasses which formed the liquid crystal shutter 1 which became independent to the eye on either side in the configuration of a solid image display device as shown in drawing 7 R> 7. The image for right eyes and the image for left eyes are displayed on a display 2 by turns, and the shutter of a right eye and a left eye is operated according to image timing with the shutter control unit 3. To a right eye In the thing which enabled it to see the image for left eyes for the image for right eyes to a left eye, and the projection mold solid image display device shown in drawing 8 again Two sets of the projectors 5 and 6 which project the image for right eyes and the image for left eyes are used. With a polarizing filter, a projector 5 polarizes in a longitudinal direction, a projector 6 polarizes to a lengthwise direction, each incident light is projected on a screen 7, right eyes are lateral polarization glasses about this, and a lengthwise direction left eye has the thing which enabled it to see the image for left eyes in a right eye in the image for right eyes at a left eye.

**[0003]**

**[Problem(s) to be Solved by the Invention]** However, in the configuration of drawing 7 , in order that the right eye and left eye of glasses might operate liquid crystal shutter 1 according to image timing with the shutter control unit 3, the connecting cord was required, and it was troublesome, for this reason it difficult to enjoy a solid image simultaneously by a lot of people. Moreover, in the configuration of drawing 8 , since it must be in agreement in the projection image of two sets of projectors, adjustment is difficult and anyone is so easy [ two sets of the projectors which project the image for right eyes and the image for left eyes are required, and ] that setting out is possible.

**[0004]** In view of this point, this invention does not have a connecting cord etc. in glasses, and offers the unnecessary solid image display device of right-and-left image positioning.

**[0005]**

**[Means for Solving the Problem]** This invention is considered as the following configurations, in order to attain the above-mentioned object.

1. Condense Light of Source of White Light on Revolution Light Filter with Condenser Lens. The reflected light which carried out light modulation to the image which led the light which carried out the color modulation at the order of red, green, and blue to DMD (digital micro mirror display) with the condensing lens, and was serially set by each color by DMD through this with a projection lens In the display which projects an image on a screen, even pairs are arranged, using as one pair three filters which are the three primary colors of a color about the above-mentioned revolution light filter, and the polarization direction is changed for every pair, and a solid image display device is constituted. Three dimensional display equipment can be offered without being able to change the deflection angle of each projection image of the image for right eyes, and the image for left eyes, and changing the basic configuration of the display using DMD a lot by this configuration.

2. Equip the polarizing filter held pivotable at the optical path of an image display device, and the solid image display device in which a convention of a polarizing filter carries out an include-angle revolution consists of timing which changes the image the object for left eyes, and for right eyes.

3. Form the image for right eyes by the 1st DMD, form the image for right eyes by the image which polarized through the 1st polarizing plate, and the 2nd DMD, and constitute the solid image display device which compounds and projects the image which polarized through the 1st polarizing plate and the 2nd polarizing plate with which

whenever [ polarization angle ] differ.

[0006]

[Embodiment of the Invention] This invention is considered as the following configurations, in order to attain the above-mentioned object. Invention of this invention according to claim 1 condenses the light of the source of the white light on a revolution light filter with a condenser lens. The reflected light which carried out light modulation to the image which led the light which carried out the color modulation at the order of red, green, and blue to DMD (digital micro mirror display) with the condensing lens, and was serially set by each color by DMD through this with a projection lens. In the display which projects an image on a screen, three filters which are the three primary colors of a color about the above-mentioned revolution light filter are made into one pair, even pairs are arranged, and the polarization direction of light is changed into the image the object for right eyes, and for left eyes for every pair [ in all ], and a solid image display device is constituted. 3-dimensional scenography can be recognized by seeing the image projected with the polarization glasses with which the deflection angle of each projection image of the image for right eyes and the image for left eyes could be changed, and the image was changed by turns at the speed which an after-image phenomenon commits, and the polarization direction of a left eye and a right eye was doubled by this configuration, respectively. Three dimensional display equipment can be offered by the above-mentioned configuration, without changing the basic configuration of the display using DMD a lot. Invention of this invention according to claim 2 equips the polarizing filter held pivotable at the optical path of an image display device, is the timing which changes the image the object for left eyes, and for right eyes, and is taken as the solid image display device with which a convention carries out the include-angle revolution of the polarizing filter. By this configuration, the image the object for left eyes from which the deflection angle differed in each, and for right eyes can be projected on a screen, and 3-dimensional scenography can be recognized by seeing the projected image with the polarization glasses with which the polarization direction of a left eye and a right eye was doubled, respectively. Invention of this invention according to claim 3 forms the image for right eyes by the 1st DMD, forms the image for right eyes by the image which polarized through the 1st polarizing plate, and the 2nd DMD, and is taken as the configuration which compounds and projects the image which polarized through the 1st polarizing plate and the 2nd polarizing plate with which whenever [ polarization angle ] differ. It is effective in the ability to recognize 3-dimensional scenography by seeing the synthetic image projected since the polarization angle of each projection image of the image for right eyes and the image for left eyes was changeable with this configuration with the polarization glasses with which the polarization direction of the image for left eyes and the image for right eyes was doubled, respectively.

[0007] (Gestalt 1 of operation) Drawing 1 - drawing 2 explain the 1st operation \*\*\*\*\* of this invention below.

[0008] Drawing 1 is one example of the solid image display device by this invention, and condenses the light of the source 11 of the white light on the rotatory polarization light filter 13 with a condenser lens 12. The light which carried out the color modulation is serially led to the order of red, green, and blue with a condensing lens 14 through this at DMD (digital micro mirror display) 15. It is what considered the reflected light which carried out light modulation to the image set by each color by DMD with the projection lens 16 as the configuration which projects an image on a screen. The above-mentioned rotatory polarization light filter 13 consists of six filters, red filter 17a which polarized in the radiation direction, green filter 17b, blue filter 17c and red filter 18a that polarized to the circumferencial direction, green filter 18b, and blue filter 18c, as shown in drawing 2. 19 is the spot of the light which condensed with the condenser lens 12. 3-dimensional scenography can be recognized by seeing the projected image with the polarization glasses with which the image for left eyes was projected on the screen by red filter 17a which polarized in the radiation direction, green filter 17b, red filter 18a which polarized to the object for right eyes, and the circumferencial direction by blue filter 17c, green filter 18b, and blue filter 18c, and the polarization direction on either side was doubled by this configuration, respectively. In addition, as long as the polarization direction of a filter has shifted about 90 degrees by the image on either side, any direction is sufficient as it.

[0009] (Gestalt 2 of operation) Drawing 3 - drawing 5 explain the 2nd operation \*\*\*\*\* of this invention below. Drawing 3 shows the block diagram of the solid image display device which used the rotatory polarization plate. With a condenser lens 12, the light of the source 11 of the white light is condensed on the revolution light filter 21 without a polarization function. The light which carried out the color modulation is serially led to the order of red, green, and blue with a condensing lens 14 through this at DMD 15. It considers as the configuration which projects an image on a screen with the projection lens 16 through the rotatory polarization filter 24 which held the reflected light which carried out light modulation to the image set by each color by DMD for the polarizing filter with the motor 22 and the belt 23, enabling a free revolution. To the timing which makes one period light which carried out the color modulation with the revolution light filter 21 at the order of red, green, and blue in the above-mentioned

configuration, and changes the image the object for left eyes, and for right eyes for every period. With the polarization glasses with which the image the object for left eyes from which the polarization angle differed in each by rotating the rotatory polarization filter 24 90 degrees like drawing 4, and for right eyes could be projected on the screen, and the polarization direction of a left eye and a right eye was doubled, respectively 3-dimensional scenography can be recognized by seeing the projected image. In addition, the polarization direction may be shifted 90 degrees by leaning the revolving shaft 26 and the polarization direction 27 of a polarizing filter 25 45 degrees, constituting them, as shown in that of drawing 5, and turning a polarizing filter over in accordance with a revolving shaft. Moreover, after carrying out the image processing of the light which carried out the spectrum to red and blue, and a green color by three DMD(s), respectively, the image display device of the type which carries out color composition is equipped with a rotatory polarization filter, and a solid image display device can consist of timing which changes the image the object for left eyes, and for right eyes also by rotating the rotatory polarization filter 24 90 degrees like drawing 4. Furthermore, even if it equips the optical path of a Braun-tube type image display device with a rotatory polarization (in case of direct viewing type the screen of the Braun tube wrap like) filter, there is same effectiveness. Moreover, the rotatory polarization filter 24, a motor 22, the timing-control circuit 28 (timing can be taken from a picture signal), etc. by this invention may be made external by the shape of a lens cap, or may be post-installed in the lens sections, such as projection equipment, as screen covering of an image display device. Moreover, in the above-mentioned example, although the polarization angle of a right-and-left image was made into 90 degrees, if an image on either side is separable, there will be no regulation in a polarization angle.

[0010] (Gestalt 3 of operation) Drawing 6 explains the 3rd operation \*\*\*\*\* of this invention below. Drawing 6 shows the block diagram of the solid image display device at the time of using DMD and a polarizing plate two, respectively. With a condenser lens 12, the light of the source 11 of the white light is condensed on the revolution light filter 21 without a polarization function. The light which carried out the color modulation is serially prepared with a condensing lens 14 in the order of red, green, and blue through this. It divides into two optical paths with a half mirror 31 and a reflecting plate 32, and DMD33 and the polarizing plate 34 which form the image for right eyes for one light are minded. To a reflecting plate 35 The light of another side is led to a half mirror 38 through DMD36 and the polarizing plate 37 which form the image for left eyes, the two above-mentioned light is compounded, and it considers as the configuration which projects an image on a screen with the projection lens 16. In the above-mentioned configuration, by changing about 90 polarization angles of a polarizing plate 34 and a polarizing plate 37, the image the object for left eyes from which the polarization angle differed in \*\*\*\*\*, and for right eyes can be projected on a screen, and 3-dimensional scenography can be recognized by seeing the projected image with the polarization glasses with which the polarization direction of a left eye image and a right eye image was doubled, respectively.

[0011] In the above-mentioned example, although the polarization angle of a right-and-left image was made into 90 degrees, if an image on either side is separable, there will be no regulation in a polarization angle.

[0012]

[Effect of the Invention] As mentioned above, three dimensional display equipment can be offered, without being able to change the polarization angle of each projection image of the image for right eyes, and the image for left eyes, and changing the basic configuration of the display using DMD a lot by the configuration which equips a revolution light filter with the light filter of the red, green, and blue of a couple with which the polarization angles of drawing 1 - drawing 2 differed. Moreover, the polarizing filter held pivotable at the optical path of an image display device of drawing 3 -5 is equipped, and to the timing which changes the image the object for left eyes, and for right eyes, by the \*\*\*\* configuration for rotatory polarization filters of a convention of a polarizing filter which carries out an include-angle revolution, since the polarization angle of each projection image of the image for right eyes and the image for left eyes is changeable into arbitration, three dimensional display equipment can be offered. Moreover, the image through the 2nd polarizing plate with which DMD which forms DMD which forms the image for the right eyes of drawing 6, the image through the 1st polarizing plate, and the image for left eyes differs from a polarization angle is compounded, and by projection soot \*\*\*\*\*, since the polarization angle of each projection image of the image for right eyes and the image for left eyes is changeable, three dimensional display equipment can be offered. It is effective in the ability to recognize 3-dimensional scenography by seeing the image projected with the above-mentioned solid image display device with the polarization glasses with which the polarization direction of a left image and a right image was doubled, respectively. Therefore, there is no connecting cord etc. in glasses, and the unnecessary solid image display device of right-and-left image positioning can be offered.

[Translation done.]

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to the solid image display device which uses an image, an alphabetic character, etc. for the projector displayed in three dimensions, a display, etc.

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**PRIOR ART**

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[Description of the Prior Art] It equips with the glasses which formed the liquid crystal shutter 1 which became independent to the eye on either side in the configuration of a solid image display device as shown in drawing 7 R> 7. The image for right eyes and the image for left eyes are displayed on a display 2 by turns, and the shutter of a right eye and a left eye is operated according to image timing with the shutter control unit 3. To a right eye In the thing which enabled it to see the image for left eyes for the image for right eyes to a left eye, and the projection mold solid image display device shown in drawing 8 again Two sets of the projectors 5 and 6 which project the image for right eyes and the image for left eyes are used. With a polarizing filter, a projector 5 polarizes in a longitudinal direction, a projector 6 polarizes to a lengthwise direction, each incident light is projected on a screen 7, right eyes are lateral polarization glasses about this, and a lengthwise direction left eye has the thing which enabled it to see the image for left eyes in a right eye in the image for right eyes at a left eye.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] As mentioned above, three dimensional display equipment can be offered, without being able to change the polarization angle of each projection image of the image for right eyes, and the image for left eyes, and changing the basic configuration of the display using DMD a lot by the configuration which equips a revolution light filter with the light filter of the red, green, and blue of a couple with which the polarization angles of drawing 1 - drawing 2 differed. Moreover, the polarizing filter held pivotable at the optical path of an image display device of drawing 3 -5 is equipped, and to the timing which changes the image the object for left eyes, and for right eyes, by the \*\*\*\* configuration for rotatory polarization filters of a convention of a polarizing filter which carries out an include-angle revolution, since the polarization angle of each projection image of the image for right eyes and the image for left eyes is changeable into arbitration, three dimensional display equipment can be offered. Moreover, the image through the 2nd polarizing plate with which DMD which forms DMD which forms the image for the right eyes of drawing 6 , the image through the 1st polarizing plate, and the image for left eyes differs from a polarization angle is compounded, and by projection soot \*\*\*\*\*, since the polarization angle of each projection image of the image for right eyes and the image for left eyes is changeable, three dimensional display equipment can be offered. It is effective in the ability to recognize 3-dimensional scenography by seeing the image projected with the above-mentioned solid image display device with the polarization glasses with which the polarization direction of a left image and a right image was doubled, respectively. Therefore, there is no connecting cord etc. in glasses, and the unnecessary solid image display device of right-and-left image positioning can be offered.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] However, in the configuration of drawing 7 , in order that the right eye and left eye of glasses might operate liquid crystal shutter 1 according to image timing with the shutter control unit 3, the connecting cord was required, and it was troublesome, for this reason it difficult to enjoy a solid image simultaneously by a lot of people. Moreover, in the configuration of drawing 8 , since it must be in agreement in the projection image of two sets of projectors, adjustment is difficult and anyone is so easy [ two sets of the projectors which project the image for right eyes and the image for left eyes are required, and ] that setting out is possible.

[0004] In view of this point, this invention does not have a connecting cord etc. in glasses, and offers the unnecessary solid image display device of right-and-left image positioning.

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MEANS

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[Means for Solving the Problem] This invention is considered as the following configurations, in order to attain the above-mentioned object.

1. Condense Light of Source of White Light on Revolution Light Filter with Condenser Lens. The reflected light which carried out light modulation to the image which led the light which carried out the color modulation at the order of red, green, and blue to DMD (digital micro mirror display) with the condensing lens, and was serially set by each color by DMD through this with a projection lens. In the display which projects an image on a screen, even pairs are arranged, using as one pair three filters which are the three primary colors of a color about the above-mentioned revolution light filter, and the polarization direction is changed for every pair, and a solid image display device is constituted. Three dimensional display equipment can be offered without being able to change the deflection angle of each projection image of the image for right eyes, and the image for left eyes, and changing the basic configuration of the display using DMD a lot by this configuration.
2. Equip the polarizing filter held pivotable at the optical path of an image display device, and the solid image display device in which a convention of a polarizing filter carries out an include-angle revolution consists of timing which changes the image the object for left eyes, and for right eyes.
3. Form the image for right eyes by the 1st DMD, form the image for right eyes by the image which polarized through the 1st polarizing plate, and the 2nd DMD, and constitute the solid image display device which compounds and projects the image which polarized through the 1st polarizing plate and the 2nd polarizing plate with which whenever [ polarization angle ] differ.

[0006]

[Embodiment of the Invention] This invention is considered as the following configurations, in order to attain the above-mentioned object. Invention of this invention according to claim 1 condenses the light of the source of the white light on a revolution light filter with a condenser lens. The reflected light which carried out light modulation to the image which led the light which carried out the color modulation at the order of red, green, and blue to DMD (digital micro mirror display) with the condensing lens, and was serially set by each color by DMD through this with a projection lens. In the display which projects an image on a screen, three filters which are the three primary colors of a color about the above-mentioned revolution light filter are made into one pair, even pairs are arranged, and the polarization direction of light is changed into the image the object for right eyes, and for left eyes for every pair [ in all ], and a solid image display device is constituted. 3-dimensional scenography can be recognized by seeing the image projected with the polarization glasses with which the deflection angle of each projection image of the image for right eyes and the image for left eyes could be changed, and the image was changed by turns at the speed which an after-image phenomenon commits, and the polarization direction of a left eye and a right eye was doubled by this configuration, respectively. Three dimensional display equipment can be offered by the above-mentioned configuration, without changing the basic configuration of the display using DMD a lot. Invention of this invention according to claim 2 equips the polarizing filter held pivotable at the optical path of an image display device, is the timing which changes the image the object for left eyes, and for right eyes, and is taken as the solid image display device with which a convention carries out the include-angle revolution of the polarizing filter. By this configuration, the image the object for left eyes from which the deflection angle differed in each, and for right eyes can be projected on a screen, and 3-dimensional scenography can be recognized by seeing the projected image with the polarization glasses with which the polarization direction of a left eye and a right eye was doubled, respectively. Invention of this invention according to claim 3 forms the image for right eyes by the 1st DMD, forms the image for right eyes by the image which polarized through the 1st polarizing plate, and the 2nd DMD, and is taken as the configuration which compounds and projects the image which polarized through the 1st polarizing plate and the 2nd polarizing plate with which whenever [ polarization angle ] differ. It is effective in the ability to

recognize 3-dimensional scenography by seeing the synthetic image projected since the polarization angle of each projection image of the image for right eyes and the image for left eyes was changeable with this configuration with the polarization glasses with which the polarization direction of the image for left eyes and the image for right eyes was doubled, respectively.

[0007] (Gestalt 1 of operation) Drawing 1 - drawing 2 explain the 1st operation \*\*\*\*\* of this invention below.

[0008] Drawing 1 is one example of the solid image display device by this invention, and condenses the light of the source 11 of the white light on the rotatory polarization light filter 13 with a condenser lens 12. The light which carried out the color modulation is serially led to the order of red, green, and blue with a condensing lens 14 through this at DMD (digital micro mirror display) 15. It is what considered the reflected light which carried out light modulation to the image set by each color by DMD with the projection lens 16 as the configuration which projects an image on a screen. The above-mentioned rotatory polarization light filter 13 consists of six filters, red filter 17a which polarized in the radiation direction, green filter 17b, blue filter 17c and red filter 18a that polarized to the circumferential direction, green filter 18b, and blue filter 18c, as shown in drawing 2. 19 is the spot of the light which condensed with the condenser lens 12. 3-dimensional scenography can be recognized by seeing the projected image with the polarization glasses with which the image for left eyes was projected on the screen by red filter 17a which polarized in the radiation direction, green filter 17b, red filter 18a which polarized to the object for right eyes, and the circumferential direction by blue filter 17c, green filter 18b, and blue filter 18c, and the polarization direction on either side was doubled by this configuration, respectively. In addition, as long as the polarization direction of a filter has shifted about 90 degrees by the image on either side, any direction is sufficient as it.

[0009] (Gestalt 2 of operation) Drawing 3 - drawing 5 explain the 2nd operation \*\*\*\*\* of this invention below.

Drawing 3 shows the block diagram of the solid image display device which used the rotatory polarization plate. With a condenser lens 12, the light of the source 11 of the white light is condensed on the revolution light filter 21 without a polarization function. The light which carried out the color modulation is serially led to the order of red, green, and blue with a condensing lens 14 through this at DMD 15. It considers as the configuration which projects an image on a screen with the projection lens 16 through the rotatory polarization filter 24 which held the reflected light which carried out light modulation to the image set by each color by DMD for the polarizing filter with the motor 22 and the belt 23, enabling a free revolution. To the timing which makes one period light which carried out the color modulation with the revolution light filter 21 at the order of red, green, and blue in the above-mentioned configuration, and changes the image the object for left eyes, and for right eyes for every period. With the polarization glasses with which the image the object for left eyes from which the polarization angle differed in each by rotating the rotatory polarization filter 24 90 degrees like drawing 4, and for right eyes could be projected on the screen, and the polarization direction of a left eye and a right eye was doubled, respectively 3-dimensional scenography can be recognized by seeing the projected image. In addition, the polarization direction may be shifted 90 degrees by leaning the revolving shaft 26 and the polarization direction 27 of a polarizing filter 25 45 degrees, constituting them, as shown in that of drawing 5, and turning a polarizing filter over in accordance with a revolving shaft. Moreover, after carrying out the image processing of the light which carried out the spectrum to red and blue, and a green color by three DMD(s), respectively, the image display device of the type which carries out color composition is equipped with a rotatory polarization filter, and a solid image display device can consist of timing which changes the image the object for left eyes, and for right eyes also by rotating the rotatory polarization filter 24 90 degrees like drawing 4. Furthermore, even if it equips the optical path of a Braun-tube type image display device with a rotatory polarization (in case of direct viewing type the screen of the Braun tube wrap like) filter, there is same effectiveness. Moreover, the rotatory polarization filter 24, a motor 22, the timing-control circuit 28 (timing can be taken from a picture signal), etc. by this invention may be made external by the shape of a lens cap, or may be post-installed in the lens sections, such as projection equipment, as screen covering of an image display device. Moreover, in the above-mentioned example, although the polarization angle of a right-and-left image was made into 90 degrees, if an image on either side is separable, there will be no regulation in a polarization angle.

[0010] (Gestalt 3 of operation) Drawing 6 explains the 3rd operation \*\*\*\*\* of this invention below. Drawing 6 shows the block diagram of the solid image display device at the time of using DMD and a polarizing plate two, respectively. With a condenser lens 12, the light of the source 11 of the white light is condensed on the revolution light filter 21 without a polarization function. The light which carried out the color modulation is serially prepared with a condensing lens 14 in the order of red, green, and blue through this. It divides into two optical paths with a half mirror 31 and a reflecting plate 32, and DMD 33 and the polarizing plate 34 which form the image for right eyes for one light are minded. To a reflecting plate 35 The light of another side is led to a half mirror 38 through

DMD36 and the polarizing plate 37 which form the image for left eyes, the two above-mentioned light is compounded, and it considers as the configuration which projects an image on a screen with the projection lens 16. In the above-mentioned configuration, by changing about 90 polarization angles of a polarizing plate 34 and a polarizing plate 37, the image the object for left eyes from which the polarization angle differed in \*\*\*\*\*, and for right eyes can be projected on a screen, and 3-dimensional scenography can be recognized by seeing the projected image with the polarization glasses with which the polarization direction of a left eye image and a right eye image was doubled, respectively.

[0011] In the above-mentioned example, although the polarization angle of a right-and-left image was made into 90 degrees, if an image on either side is separable, there will be no regulation in a polarization angle.

[0012]

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** It is an important section outline block diagram in the 1st operation gestalt of the solid image display device by this invention.

**[Drawing 2]** The block diagram of the rotatory polarization light filter which is the component part of the solid image display device of drawing 1 is shown.

**[Drawing 3]** It is an important section outline block diagram in the 2nd operation gestalt of the solid image display device by this invention.

**[Drawing 4]** Actuation of the rotatory polarization filter which is the component part of the solid image display device of drawing 3 is shown.

**[Drawing 5]** Another example of the rotatory polarization filter which is the component part of the solid image display device of drawing 3 shows actuation.

**[Drawing 6]** It is an important section outline block diagram in the 3rd operation gestalt of the solid image display device by this invention.

**[Drawing 7]** It is the outline block diagram of the solid image display device using the glasses which prepared the liquid crystal shutter which became independent to the eye on either side in the conventional example.

**[Drawing 8]** It is the outline block diagram of the projection mold solid image display device using two sets of the projectors which project the image for right eyes, and the image for left eyes in the conventional example.

**[Description of Notations]**

11 Source of White Light

12 Condenser Lens

13 Rotatory Polarization Light Filter

14 Condensing Lens

15 DMD (Digital Micro Mirror Display)

16 Projection Lens

17a Red filter

17b Green filter

17c Blue filter

18a Red filter

18b Green filter

18c Blue filter

21 Revolution Light Filter

22 Motor

23 Belt

24 Rotatory Polarization Filter

25 Polarizing Filter

26 Revolving Shaft

27 The Polarization Direction

31 Half Mirror

32 Reflecting Plate

33 DMD

34 Polarizing Plate

35 Reflecting Plate

36 DMD

37 Polarizing Plate  
38 Half Mirror

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[Translation done.]



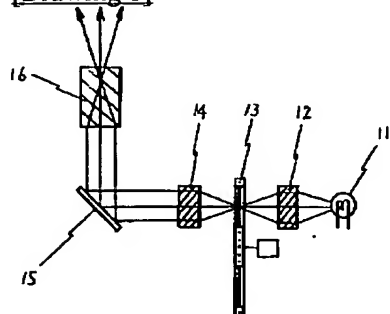
## \* NOTICES \*

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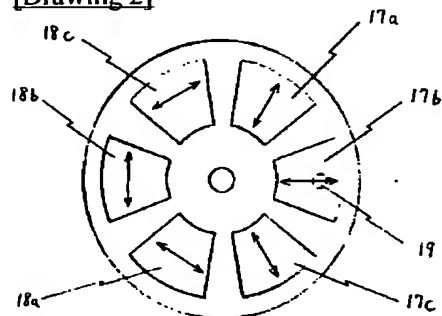
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DRAWINGS

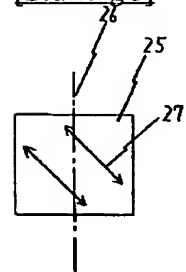
[Drawing 1]



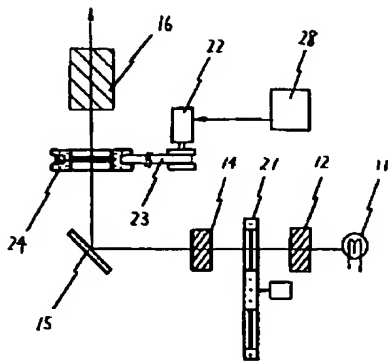
[Drawing 2]



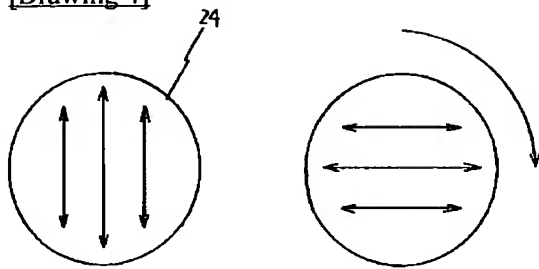
[Drawing 5]



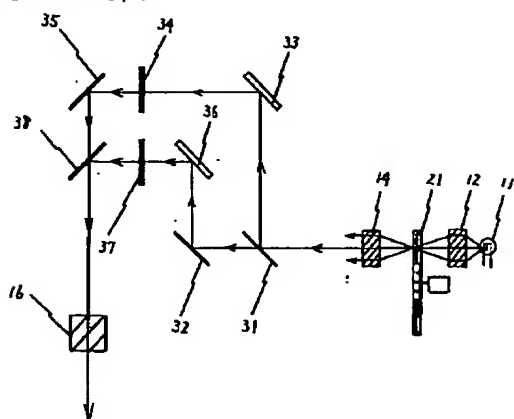
[Drawing 3]



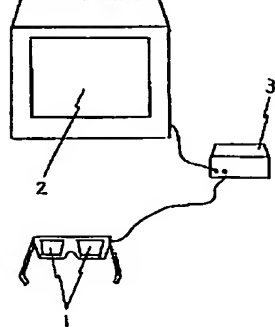
[Drawing 4]



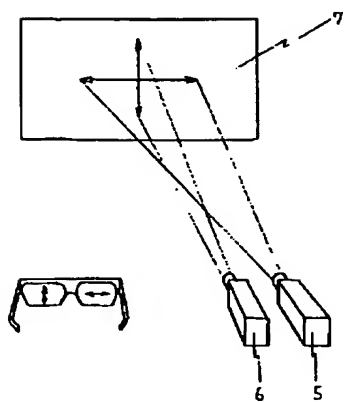
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]

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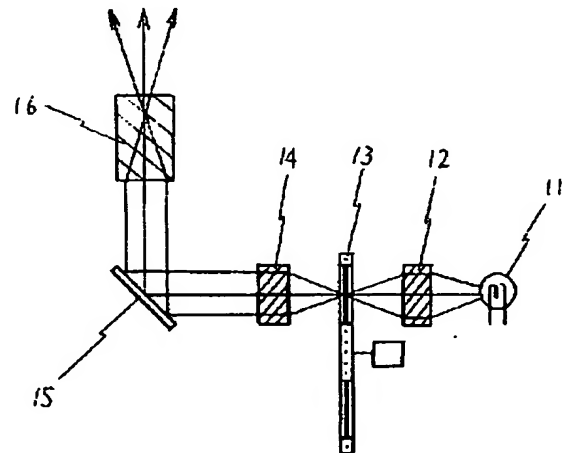
山口県山口市大字吉敷2593-45

(54) 【発明の名称】 立体画像表示装置

(57) 【要約】 (修正有)

【課題】 眼鏡に接続コード等がなく、また、画像位置調整の不要な立体画像表示装置を提供する。

【解決手段】 白色光源11の光を集光レンズ12により回転偏光カラーフィルタ13上に集光し、これを通してシリアルに赤・緑・青の順に色変調した光をコンデンサレンズ14によりDMD(デジタル・マイクロミラー・ディスプレイ)15に導き、DMDにより各色に合わせた画像に光変調した反射光を投影レンズ16により、スクリーン上に画像を投影する構成とし、上記偏光回転カラーフィルタ13を放射方向に偏光した赤フィルタ、緑フィルタ、青フィルタおよび、円周方向に偏光した赤フィルタ、緑フィルタ、青フィルタの6つのフィルタにて形成したものである。



## 【特許請求の範囲】

【請求項1】白色光源の光を集光レンズにより回転カラーフィルタ上に集光し、これを通してシリアルに赤・緑・青の順に色変調した光をコンデンサレンズによりDMD（デジタル・マイクロミラー・ディスプレイ）に導き、DMDにより各色に合わせた画像に光変調した反射光を投影レンズにより、スクリーン上に画像を投影する表示装置において、上記回転カラーフィルタを色の3原色である3つのフィルタを1対として偶数対配置し、かつ、1対ごとに偏光方向を変えて構成したことを特徴とする立体画像表示装置。

【請求項2】画像表示装置の光路に回転可能に保持された偏光フィルタを装備し、左眼用と右眼用の画像を切り替えるタイミングで、偏光フィルタを規定の角度回転させることを特徴とする立体画像表示装置。

【請求項3】第1のDMDにより右眼用の画像を形成し、第1の偏光板を介して偏光した画像と、第2のDMDにより右眼用の画像を形成し、第1の偏光板と偏光角度の異なる第2の偏光板を介して偏光した画像を合成して投影することを特徴とする立体画像表示装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は画像や文字等を立体的に表示するプロジェクターやディスプレイ等に用いる立体画像表示装置に関するものである。

## 【0002】

【従来の技術】立体画像表示装置の構成においては、図7に示すように左右の眼に独立した液晶シャッター1を設けた眼鏡を装着し、ディスプレイ2に右目用の画像と左目用の画像を交互に表示し、シャッター制御装置3にて画像タイミングに合わせて右目と左目のシャッターを作動し、右目には、右目用の画像を、左目には左目用の画像を見ることができるようにしたものや、また、図8に示す投影型立体画像表示装置においては、右目用の画像と左目用の画像を投影する2台の投影機5、6を用い、それぞれの投射光を偏光フィルタにより投影機5は横方向、投影機6は縦方向に偏光してスクリーン7に投影し、これを右目は縦方向左目は横方向の偏光眼鏡で、右目には右目用の画像を、左目には左目用の画像を見ることができるようにしたもの等がある。

## 【0003】

【発明が解決しようとする課題】しかしながら、図7の構成の場合、シャッター制御装置3にて画像タイミングに合わせて眼鏡の右目と左目の液晶シャッター1作動するため接続コードが必要で煩わしく、このために多人数で立体画像を同時に楽しむことは困難であった。また、図8の構成の場合、右目用の画像と左目用の画像を投影する2台の投影機が必要で、かつ、2台の投影機の投影画像を一致しないといけないので調整が難しくだれでも設定ができるほど手軽ではない。

【0004】本発明はかかる点に鑑み、眼鏡に接続コード等がなく、また、左右画像位置調整の不要な立体画像表示装置を提供するものである。

## 【0005】

【課題を解決するための手段】本発明は上記目的を達成するために以下の構成としたものである。

1. 白色光源の光を集光レンズにより回転カラーフィルタ上に集光し、これを通してシリアルに赤・緑・青の順に色変調した光をコンデンサレンズによりDMD（デジタル・マイクロミラー・ディスプレイ）に導き、DMDにより各色に合わせた画像に光変調した反射光を投影レンズにより、スクリーン上に画像を投影する表示装置において、上記回転カラーフィルタを色の3原色である3つのフィルタを1対として偶数対配置し、かつ、1対ごとに偏光方向を変えて立体画像表示装置を構成する。この構成により、右眼用画像と左眼用画像のそれぞれの投影画像の偏向角を変えることができ、DMDを用いた表示装置の基本構成を大きく変えることなく、立体表示装置を提供できる。

2. 画像表示装置の光路に回転可能に保持された偏光フィルタを装備し、左眼用と右眼用の画像を切り替えるタイミングで、偏光フィルタを規定の角度回転する立体画像表示装置を構成する。

3. 第1のDMDにより右眼用の画像を形成し、第1の偏光板を介して偏光した画像と、第2のDMDにより右眼用の画像を形成し、第1の偏光板と偏光角度の異なる第2の偏光板を介して偏光した画像を合成して投影する立体画像表示装置を構成する。

## 【0006】

【発明の実施形態】本発明は上記目的を達成するために以下の構成としたものである。本発明の請求項1に記載の発明は、白色光源の光を集光レンズにより回転カラーフィルタ上に集光し、これを通してシリアルに赤・緑・青の順に色変調した光をコンデンサレンズによりDMD（デジタル・マイクロミラー・ディスプレイ）に導き、DMDにより各色に合わせた画像に光変調した反射光を投影レンズにより、スクリーン上に画像を投影する表示装置において、上記回転カラーフィルタを色の3原色である3つのフィルタを1対として偶数対配置し、かつ、右眼用と左眼用の画像に合わせて1対ごとに光の偏光方向を変えて立体画像表示装置を構成したものである。この構成により、右眼用画像と左眼用画像のそれぞれの投影画像の偏向角を変えることができ、残像現象が働くスピードで交互に画像を切り替え、かつ、左眼と右眼の偏光方向をそれぞれ合わせた偏光眼鏡で投影された画像を見ることにより、立体映像を認識することができる。上記構成により、DMDを用いた表示装置の基本構成を大きく変えることなく、立体表示装置を提供できる。本発明の請求項2に記載の発明は、画像表示装置の光路に回転可能に保持された偏光フィルタを装備し、左眼用と右

眼用の画像を切り替えるタイミングで、偏光フィルタを規定の角度回転させる立体画像表示装置としたものである。この構成により、それぞれに偏角の異なった左眼用と右眼用の画像をスクリーンに投影でき、左眼と右眼の偏光方向をそれぞれ合わせた偏光眼鏡で、投影された画像を見ることにより立体映像を認識することができる。本発明の請求項3に記載の発明は、第1のDMDにより右眼用の画像を形成し、第1の偏光板を介して偏光した画像と、第2のDMDにより右眼用の画像を形成し、第1の偏光板と偏光角度の異なる第2の偏光板を介して偏光した画像を合成して投影する構成としたものである。この構成によっても右眼用画像と左眼用画像のそれぞれの投影画像の偏光角を変えることができるため投影した合成画像を、左眼用画像と右眼用画像の偏光方向をそれぞれ合わせた偏光眼鏡で、見ることにより立体映像を認識できるという効果がある。

【0007】(実施の形態1)以下本発明の第1の実施形態をを図1～図2により説明する。

【0008】図1は、本発明による立体画像表示装置の一実施例で、白色光源11の光を集光レンズ12により回転偏光カラーフィルタ13上に集光し、これを通してシリアルに赤・緑・青の順に色変調した光をコンデンサレンズ14によりDMD(デジタル・マイクロミラー・ディスプレイ)15に導き、DMDにより各色に合わせた画像に光変調した反射光を投影レンズ16により、スクリーン上に画像を投影する構成としたもので、図2に示すとおり、上記回転偏光カラーフィルタ13を放射方向に偏光した赤フィルタ17a、緑フィルタ17b、青フィルタ17cおよび、円周方向に偏光した赤フィルタ18a、緑フィルタ18b、青フィルタ18cの6つのフィルタにて構成したものである。19は集光レンズ12により集光した光のスポットである。この構成により、放射方向に偏光した赤フィルタ17a、緑フィルタ17b、青フィルタ17cにより右眼用、円周方向に偏光した赤フィルタ18a、緑フィルタ18b、青フィルタ18cにより左眼用の画像をスクリーンに投影し、左右の偏光方向をそれぞれ合わせた偏光眼鏡で、投影された画像を見ることにより立体映像を認識することができる。なお、フィルタの偏光方向は、左右の画像で約90度ずれていればどの方向でも良い。

【0009】(実施の形態2)以下本発明の第2の実施形態をを図3～図5により説明する。図3は、回転偏光板を用いた立体画像表示装置の構成図を示す。白色光源11の光を集光レンズ12により、偏光機能のない回転カラーフィルタ21上に集光し、これを通してシリアルに赤・緑・青の順に色変調した光をコンデンサレンズ14によりDMD15に導き、DMDにより各色に合わせた画像に光変調した反射光を、モーター22とベルト23により偏光フィルタを回転自在に保持した回転偏光フィルタ24を介して、投影レンズ16により、スクリー

ン上に画像を投影する構成としたものである。上記構成において、回転カラーフィルタ21により赤・緑・青の順に色変調した光を1周期とし、1周期毎に左眼用と右眼用の画像を切り替えるタイミングで、図4のごとく回転偏光フィルタ24を90度回転することにより、それぞれに偏光角の異なった左眼用と右眼用の画像をスクリーンに投影でき、左眼と右眼の偏光方向をそれぞれ合わせた偏光眼鏡で、投影された画像を見ることにより立体映像を認識することができる。なお、図5のに示すように偏光フィルタ25の回転軸26と偏光方向27を45度傾けて構成し、偏光フィルタを回転軸に沿って裏返すことにより、偏光方向を90度ずらしても良い。また、赤・青・緑の色に分光した光を3つのDMDで、それぞれ画像処理した後、色合成するタイプの画像表示装置に回転偏光フィルタを装備し、左眼用と右眼用の画像を切り替えるタイミングで、図4のごとく回転偏光フィルタ24を90度回転することによっても立体画像表示装置を構成できる。さらに、ブラウン管タイプの画像表示装置の光路に(直視型の場合はブラウン管の表示面を覆うように)回転偏光フィルタを装着しても同様の効果がある。また、本発明による回転偏光フィルタ24とモーター22およびタイミング制御回路28(タイミングは画像信号より取れる)等は投影装置等のレンズ部にレンズキャップ状で外付けにしたり、画像表示装置の画面カバーとして後付けしてもよい。また、上記実施例において、左右画像の偏光角を90度としたが、左右の画像が分離できれば偏光角に規制はない。

【0010】(実施の形態3)以下本発明の第3の実施形態をを図6により説明する。図6は、DMDと偏光板をそれぞれ2つ用いた場合の立体画像表示装置の構成図を示す。白色光源11の光を集光レンズ12により、偏光機能のない回転カラーフィルタ21上に集光し、これを通してシリアルに赤・緑・青の順に色変調した光をコンデンサレンズ14で整えて、ハーフミラー31と反射板32により2つの光路に分け、一方の光を右眼用の画像を形成するDMD33と偏光板34を介して反射板35に、他方の光を左眼用の画像を形成するDMD36と偏光板37を介してハーフミラー38に導いて上記2つの光を合成し、投影レンズ16により、スクリーン上に画像を投影する構成としたものである。上記構成において、偏光板34と偏光板37の偏光角約90度を異ならせることにより、それぞれに偏光角の異なった左眼用と右眼用の画像をスクリーンに投影でき、左眼画像と右眼画像の偏光方向をそれぞれ合わせた偏光眼鏡で、投影された画像を見ることにより立体映像を認識することができる。

【0011】上記実施例において、左右画像の偏光角を90度としたが、左右の画像が分離できれば偏光角に規制はない。

【0012】

【発明の効果】以上のように、図1～図2の、偏光角の異なった一対の赤・緑・青のカラーフィルタを、回転カラーフィルタに装備する構成により、右眼用画像と左眼用画像のそれぞれの投影画像の偏光角を変えることができ、DMDを用いた表示装置の基本構成を大きく変えることなく、立体表示装置を提供できる。また、図3～5の、画像表示装置の光路に回転可能に保持された偏光フィルタを装備し、左眼用と右眼用の画像を切り替えるタイミングで、偏光フィルタを規定の角度回転させる回転偏光フィルタ用いた構成により、右眼用画像と左眼用画像のそれぞれの投影画像の偏光角を任意に変えることができるため立体表示装置を提供できる。また、図6の右眼用の画像を形成するDMDと第1の偏光板を介した画像と、左眼用の画像を形成するDMDと偏光角の異なる第2の偏光板を介した画像を合成して投影することにより、右眼用画像と左眼用画像のそれぞれの投影画像の偏光角を変えることができるため立体表示装置を提供できる。上記の立体画像表示装置で投影した画像を、左画像と右画像の偏光方向をそれぞれ合わせた偏光眼鏡で、見ることにより立体映像を認識できるという効果がある。よって、眼鏡に接続コード等がなく、また、左右画像位置調整の不要な立体画像表示装置を提供することができる。

【図面の簡単な説明】

【図1】本発明による立体画像表示装置の第1の実施形態における要部概略構成図である。

【図2】図1の立体画像表示装置の構成部品である回転偏光カラーフィルタの構成図を示す。

【図3】本発明による立体画像表示装置の第2の実施形態における要部概略構成図である。

【図4】図3の立体画像表示装置の構成部品である回転偏光フィルタの動作を示す。

【図5】図3の立体画像表示装置の構成部品である回転偏光フィルタの別実施例で、動作を示す。

【図6】本発明による立体画像表示装置の第3の実施形態における要部概略構成図である。

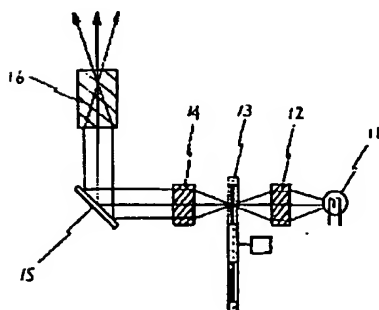
【図7】従来例で、左右の眼に独立した液晶シャッターを設けた眼鏡を用いた立体画像表示装置の概略構成図である。

【図8】従来例で、右目用の画像と左目用の画像を投影する2台の投影机を用いた投影型立体画像表示装置の概略構成図である。

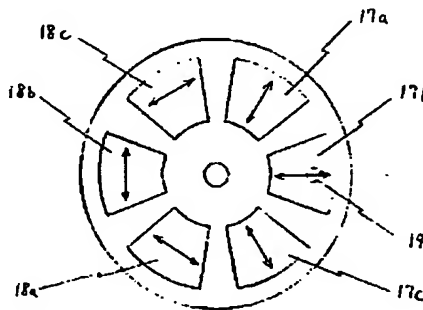
【符号の説明】

- 11 白色光源
- 12 集光レンズ
- 13 回転偏光カラーフィルタ
- 14 コンデンサレンズ
- 15 DMD (デジタル・マイクロミラー・ディスプレイ)
- 16 投影レンズ
- 17a 赤フィルタ
- 17b 緑フィルタ
- 17c 青フィルタ
- 18a 赤フィルタ
- 18b 緑フィルタ
- 18c 青フィルタ
- 21 回転カラーフィルタ
- 22 モーター
- 23 ベルト
- 24 回転偏光フィルタ
- 25 偏光フィルタ
- 26 回転軸
- 27 偏光方向
- 31 ハーフミラー
- 32 反射板
- 33 DMD
- 34 偏光板
- 35 反射板
- 36 DMD
- 37 偏光板
- 38 ハーフミラー

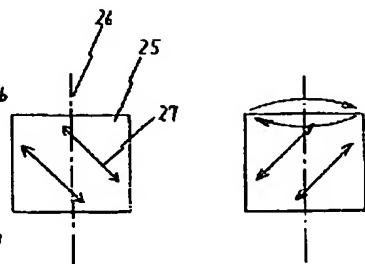
【図1】



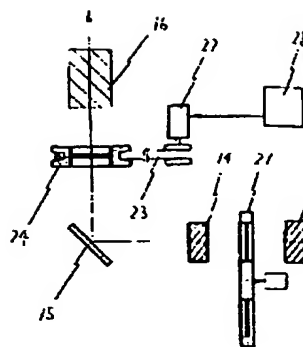
【図2】



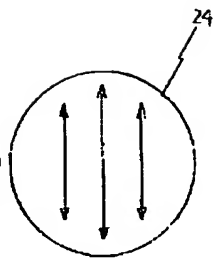
【図5】



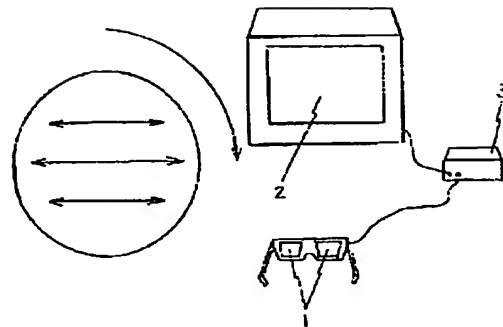
【図3】



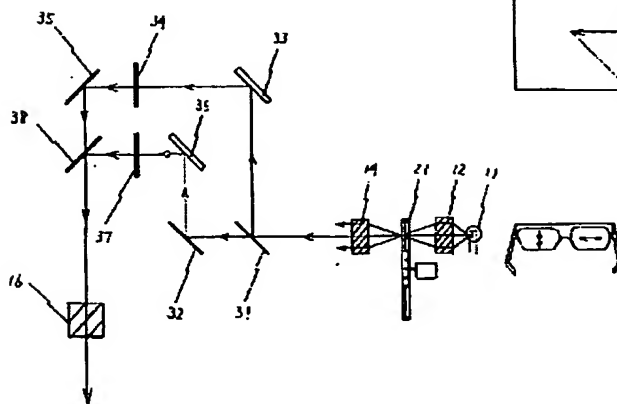
【図4】



【図7】



【図6】



【図8】

